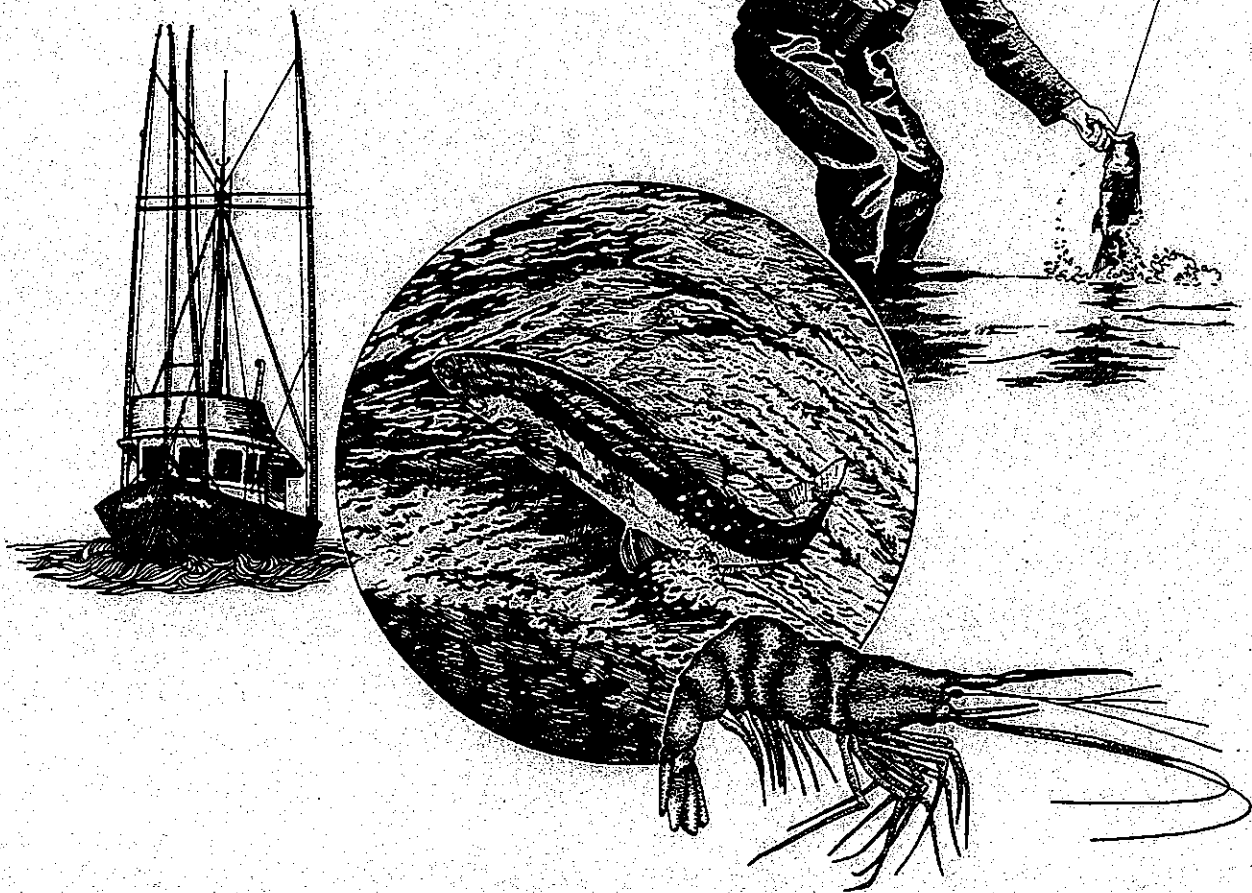


# ANNUAL PROGRESS REPORTS

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## FISH DIVISION

### Oregon Department of Fish and Wildlife

Summer Steelhead Creel Surveys on the Grande Ronde,  
Wallowa, and Imnaha Rivers for the 1997-98 Run Year

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ANNUAL PROGRESS REPORT

FISH RESEARCH PROJECT  
OREGON

PROJECT TITLE: Summer Steelhead Creel Surveys on the  
Grande Ronde, Wallowa, and Imnaha  
Rivers for the 1997-98 Run Year

AGREEMENT NUMBER: 14-48-14110-97-J039

PROJECT PERIOD: 1 April 1998 to 31 March 1999

Prepared by: Michael W. Flesher  
Richard W. Carmichael  
Timothy A. Whitesel

Oregon Department of Fish and Wildlife  
2501 SW First Street  
P.O. Box 59  
Portland, OR 97207

This project was financed by the U.S. Fish and Wildlife Service under the Lower Snake River Compensation Plan.



## **PREFACE**

This report is for the funding period 1 April 1998 to 31 March 1999. The sampling period was from 1 September 1997 to 15 April 1998. The report summarizes statistical angler surveys conducted during the summer steelhead angling season in major fishing areas on the Grande Ronde, Wallowa, and Imnaha rivers. Hatchery adults harvested during the 1997-98 run year are primarily from the 1994 and 1995 brood years. Results of creel surveys conducted prior to fall 1997 are reported in previous Lower Snake River Compensation Plan evaluation annual reports (Carmichael et al. 1986, 1987, 1988, 1989, 1990; Flesher et al. 1991, 1992, 1993, 1994, 1995, 1996, 1997). The steelhead angling season surveyed in this report, during which only adipose-clipped fish could be kept, was open from 1 September 1997 to 15 April 1998 in the Grande Ronde and Imnaha basins.

## **ACKNOWLEDGMENTS**

We would like to thank Dan Herrig for his review of the report, Mary Buckman for the statistical design and analysis of the data, James Stengle and Mark Myers for their dedication in conducting the surveys. Also, from the Washington Department of Fish and Wildlife, we would like to thank Art Viola for coordinating and John Johnston and Mark August who conducted the lower Grande Ronde survey during the spring. This project was financed by the U.S. Fish and Wildlife Service under the Lower Snake River Compensation Plan, as a cooperative agreement with the Oregon Department of Fish and Wildlife.

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## SUMMARY

Angler effort and harvest for summer steelhead on the lower Grande Ronde River was the highest observed since consumptive fisheries re-opened in 1985. Similarly, catch rates during spring fisheries on the upper Grande Ronde and Wallowa rivers, Catherine Creek, and at Rondowa were also much better than in recent years, however catch rate on the Imnaha River was one of the poorest observed since surveys began in 1985.

Hatchery summer steelhead dominated the catch almost every month in Grande Ronde and Imnaha basin fisheries.

Anglers harvested more one-ocean than two-ocean hatchery steelhead and about even numbers of males and females in Grande Ronde and Imnaha basin fisheries.

We sampled AdLV+CWT marked summer steelhead in each Grande Ronde and Imnaha basin fishery, except for Catherine Creek and the upper Grande Ronde River, however expanded estimates for entire fisheries will not be determined until state harvest punch card data become available.

More recreational anglers from Oregon counties other than Union or Wallowa (local anglers) fished for summer steelhead during the 1997-98 run year in Grande Ronde and Imnaha basin fisheries than in any previous year since surveys began in 1985.

## INTRODUCTION

Summer steelhead (*Oncorhynchus mykiss*) fisheries in the Grande Ronde and Imnaha basins were closed in 1974. This closure was prompted by declining adult returns, as indicated by adult counts at Ice Harbor Dam on the Snake River (U.S. Army Corps of Engineers 1996) and low steelhead redd counts on index streams in the Grande Ronde and Imnaha basins (Oregon Department of Fish and Wildlife District Annual Reports 1949-1974). The Lower Snake River Compensation Plan (LSRCP), initiated by Congress in 1976, was developed to compensate for losses of anadromous salmonids in the Snake River basin from construction of the four lower Snake River Dams built between 1962 and 1976. Thus, the focus of the LSRCP is above Lower Granite Dam (Rkm 173), the uppermost of the four lower dams on the Snake River. One of the primary objectives of the LSRCP in Oregon is to restore historic recreational and tribal fisheries for summer steelhead in the Grande Ronde and Imnaha basins (Carmichael 1989). Approximately 1.68 M steelhead smolts are released in Oregon each year during April and May in the Grande Ronde and Imnaha basins. These fish provide hatchery adult returns which contribute to recreational fisheries and may supplement natural spawning populations in northeast Oregon. Consumptive recreational fisheries for summer steelhead re-opened in 1986, in part as a result of increases in hatchery adult returns.

We began creel surveys for summer steelhead during the fall of 1985 in both the Grande Ronde and Imnaha basins. The goal of the surveys is to provide annual harvest information needed to assess LSRCP compensation goals (Carmichael and Wagner 1983). In general, the number of summer steelhead in the recreational fishery has been restored to historic values, but the fishery is concentrated in different times and places (Fletcher et al. 1994). This report summarizes results of creel surveys conducted during the fall of 1997 and the spring of 1998 in the Grande Ronde and Imnaha basins. The Grande Ronde and Imnaha basins encompass the major steelhead fisheries in Oregon that occur in streams which drain into the Snake River upstream of Lower Granite Dam.

## **STUDY AREA**

Creel surveys on the Grande Ronde River were conducted on a 24 km section on the lower river from the Oregon-Washington state line (Rkm 62) to Wildcat Creek (Rkm 86) and an upper 39 km section from Highway 82 bridge at Island City (Rkm 256) to Meadow Creek (Rkm 295). The survey on Catherine Creek was conducted on a 22 km section from the Highway 203 bridge below the town of Union (Rkm 24) to the Highway 203 bridge above Catherine Creek State Park (Rkm 46). Surveys on the Wallowa River were conducted on a 6 km section from its confluence with the Grande Ronde River at Rondowa (mouth of the Wallowa River) to Howard Creek (Rkm 6) and a 50 km section from Minam State Park (Rkm 13) to the mouth of Trout Creek (Rkm 63) near Enterprise. Anglers who parked their vehicles at Minam State Park to fish just below the park were included in the survey. The survey on the Imnaha River was conducted on the lower 32 km from its confluence with the Snake River (Rkm 0) to the mouth of Big Sheep Creek (Rkm 32) near the town of Imnaha. These areas are shown in Figure 1.

## **METHODS**

For the lower Grande Ronde River survey, we used the methodology described by Carmichael et al. (1988). We sampled 50% of the weekends and holidays and 30% of the weekdays during each month of each survey. Initially, sample days were chosen randomly. They were then adjusted so that, as much as possible, Saturday, Sunday, and holidays were represented equally and Monday through Friday were represented equally. Each sample day, beginning with a randomly selected start time, the creel surveyor conducted a pressure count which involved driving a vehicle along the entire survey route while tallying all anglers and vehicles every three hours. Between pressure counts, the surveyor interviewed anglers by recording a description of each angler or their vehicle and their residence, the number of hours they had fished, and the number and species caught. The surveyor also sampled all harvested fish recording fork length, sex, fin clip, and any external tags. If the fish was coded-wire-tagged, as

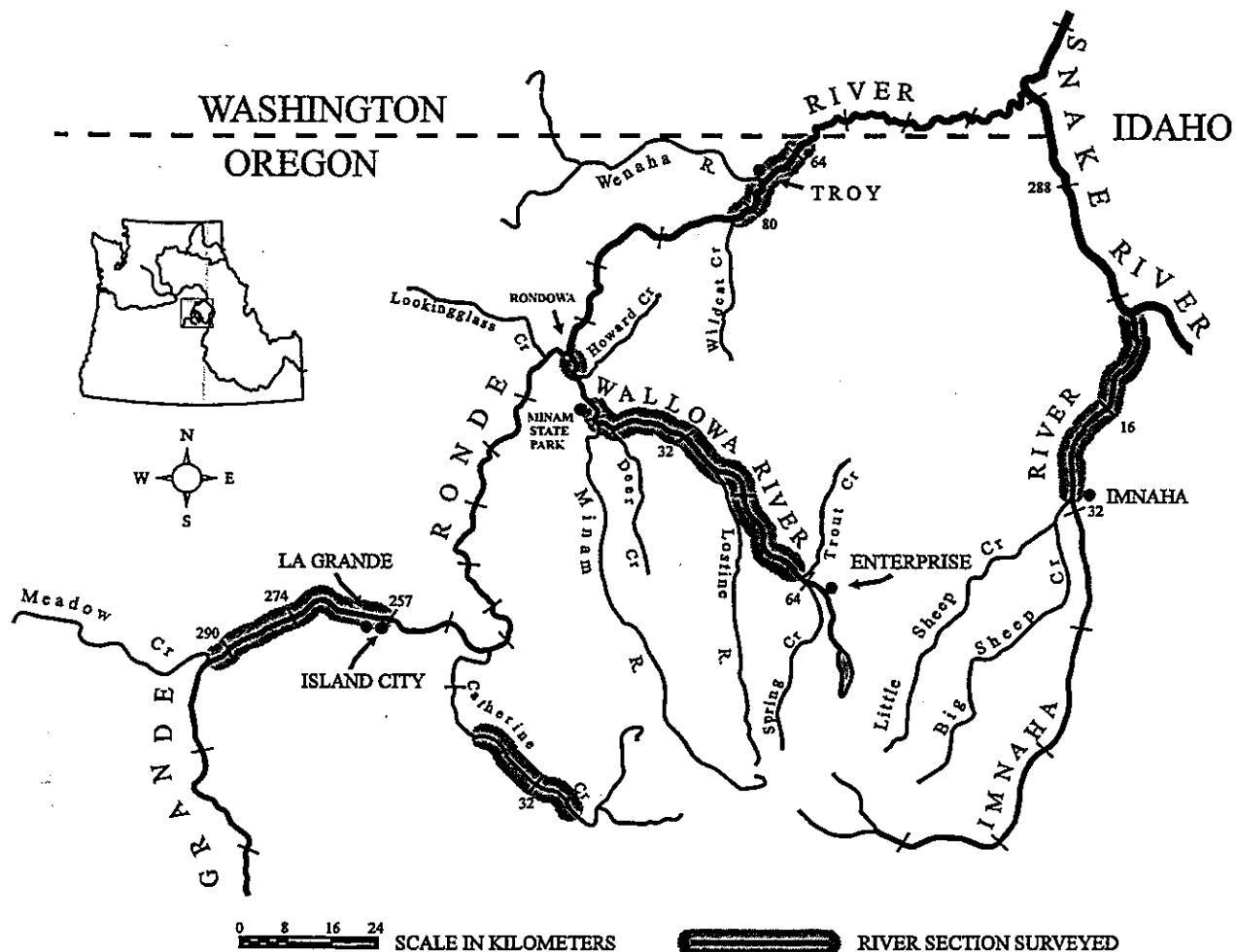


Figure 1. Map of northeastern Oregon showing where summer steelhead creel surveys were conducted in the Grande Ronde and Imnaha basins during the 1997-98 run year.

indicated by an adipose fin-clip and left ventral fin-clip (AdLV+CWT), the surveyor asked permission from the angler, then excised the head behind the eye and placed it with an identification number in a plastic bag for later processing.

For the upper Grande Ronde River, Catherine Creek, Rondowa, Wallowa River, and Imnaha River survey areas, one surveyor conducted angler interviews from 1 February to 15 April 1998. The Wallowa River was surveyed each sample day and other areas were surveyed a minimum of once each weekday and every other weekend. Rondowa was surveyed only when the surveyor could obtain access through private lands, since the usual route via Smith Mountain road was impassable. A minimum of two areas were surveyed each sample day. Throughout the season, the surveyor alternated between morning and afternoon interviews in each area. Each sample day, the surveyor drove the survey route, stopped to interview anglers, then drove to the next area and repeated this sequence. If sufficient time was available, the surveyor drove to and interviewed anglers in a third area. All harvested fish observed were sampled. We sampled 80% of the weekends and from 40-60% of the weekdays. From 1 February to 28 February, we surveyed 5 days per week from 0800-1700. From 1 March to 15 April, we surveyed 4 days per week from 0700-1800.

From the lower Grande Ronde River creel survey, we estimated angler effort in hours and days, total catch, harvest, catch rate, the percent of hatchery fish in the catch, and the number of AdLV+CWT marked fish harvested (see Carmichael et al. 1988). In all other areas, we estimated catch rate and the percent of hatchery fish in the catch. In addition, we determined the age and sex composition and mean fork length of harvested fish in all survey areas. Catch rate is an index, expressed as hours per fish, which results in lower catch rates reflecting better angling success. The survey on the lower Grande Ronde River was from 1 September 1997 to 15 April 1998. Surveys on the upper Grande Ronde, Wallowa, and Imnaha rivers, and Catherine Creek were from 1 February to 15 April 1998. The Rondowa survey (lower 6 km of the Wallowa River) was from 15 February to 15 March 1998.

## **ACCOMPLISHMENTS AND FINDINGS**

On the lower Grande Ronde River, we sampled an average of 52.1% of the weekends and holidays and 29.5% of the weekdays each month for a total of 83 sample days. On the upper Grande Ronde River, we sampled an average of 27.3% of the weekends and holidays and 19.2% of the weekdays each month for a total of 16 sample days. On Catherine Creek, we sampled an average of 22.7% of the weekends and holidays and 19.2% of the weekdays each month for a total of 15 sample days. At Rondowa, because of limited road access, we only sampled an average of 10.5% of the weekends and holidays and 4.5% of the weekdays during February and March, for a total of 4 sample days. On the Wallowa River, we sampled an average of 63.6% of the weekends and holidays and 57.7% of the weekdays each month for a total of 44

weekends and holidays and 57.7% of the weekdays each month for a total of 44 sample days. On the Imnaha River, we sampled an average of 27.3% of the weekends and holidays and 17.3% of the weekdays each month for a total of 15 sample days.

We estimated that 3,784 anglers fished for 19,984 hours on the lower Grande Ronde River. They caught and released 432 wild and 908 hatchery steelhead and kept 1,415 hatchery steelhead for a catch rate index of 7 hours per fish (Figures 2-6, Appendix A-1). The percent of steelhead caught that were hatchery fish ranged from 50% in September 1997 to 97% in January 1998 (Figure 7, Appendix B). Mean fork length ( $\pm 95\%$  confidence interval) of harvested hatchery steelhead was 645 ( $\pm 13$ ) mm for males and 643 ( $\pm 10$ ) mm for females (Table 1). Age composition of harvested hatchery steelhead was 64% 1:1's, 34% 1:2's and 2% 2:1's. Sex composition was 39% male and 61% female (Table 1). Seventy percent of the anglers were from Union or Wallowa counties, 19% were from other Oregon counties, 6% were Washington residents and 5% resided outside the states of Oregon and Washington (Table 2). On the lower Grande Ronde River, anglers harvested an estimated 84 AdLV+CWT marked steelhead from our hatchery releases, and an estimated 5 AdLV+CWT marked steelhead that were strays from Washington Department of Fish and Wildlife releases at Dayton Pond on the Touchet River, Washington (Table 3). During the 1996-97 run year on the lower Grande Ronde River, anglers harvested an estimated 34 AdLV+CWT marked steelhead from our hatchery releases (Table 3).

On the upper Grande Ronde River, the catch rate index averaged 13 hours per fish (Figure 4, Appendix A-2). The percent of steelhead caught that were hatchery fish ranged from 78% in April to 83% in March (Figure 7, Appendix B). Mean fork length ( $\pm 95\%$  confidence interval) of harvested hatchery steelhead was 603 ( $\pm 32$ ) mm for males and 660 mm for a female (Table 1). Age composition of harvested hatchery steelhead was 100% 1:1's. Sex composition was 67% male and 33% female (Table 1). Ninety-five percent of the anglers were from Union or Wallowa counties, 3% were from other Oregon counties, 1% were Washington residents and 1% resided outside the states of Oregon and Washington (Table 2). Anglers did not harvest any AdLV+CWT marked steelhead on the upper Grande Ronde River this year or during the 1996-97 run year (Table 3).

On Catherine Creek, the catch rate index averaged 7 hours per fish (Figure 4, Appendix A-3). One harvested fish was sampled. It was a 611 mm, age 1:1 male (Figure 7, Table 1, Appendix B). Eighty-eight percent of the anglers were from Union or Wallowa counties, 6% were from other Oregon counties, 0% were Washington residents and 6% resided outside the states of Oregon and Washington (Table 2). Anglers did not harvest any AdLV+CWT marked steelhead on Catherine Creek this year or during the 1996-97 run year (Table 3).

At Rondowa, the catch rate index averaged 11 hours per fish (Figure 4, Appendix A-4). The percent of steelhead caught that were hatchery fish ranged from 80% in

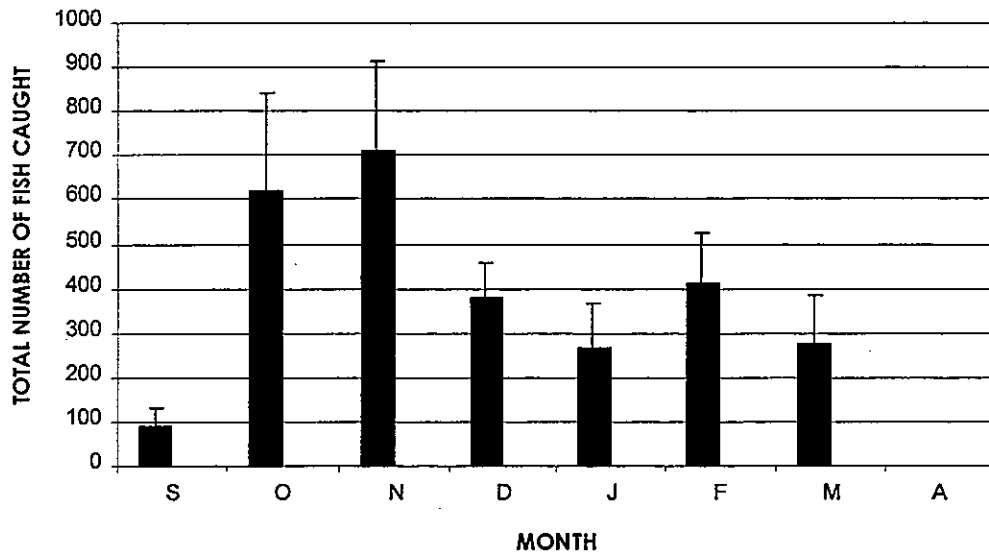


Figure 2. Estimated total catch of summer steelhead on the lower Grande Ronde River during the 1997-98 run year. The survey was conducted from 1 September 1997 to 15 April 1998. Error bars indicate upper 95% confidence interval.

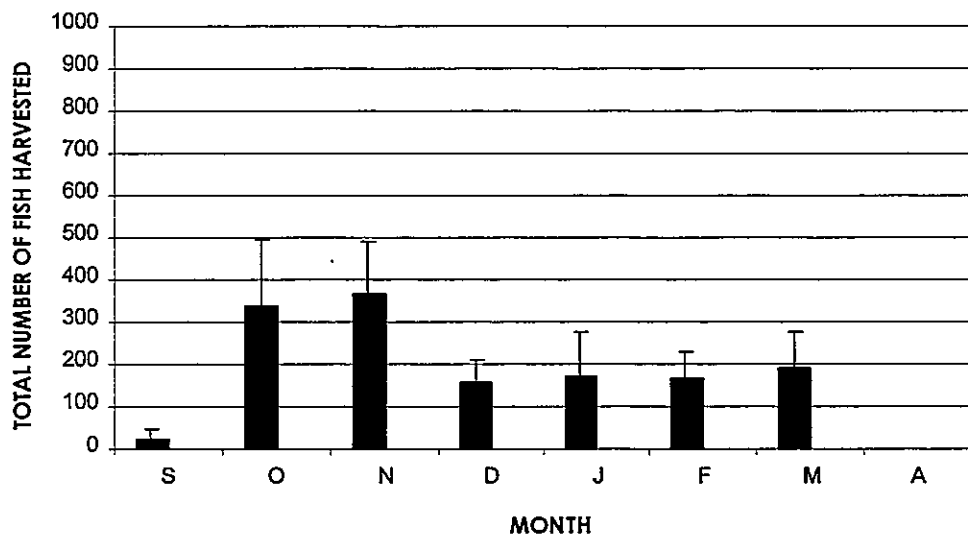


Figure 3. Estimated total harvest of summer steelhead on the lower Grande Ronde River during the 1997-98 run year. The survey was conducted from 1 September 1997 to 15 April 1998. Error bars indicate upper 95% confidence interval.



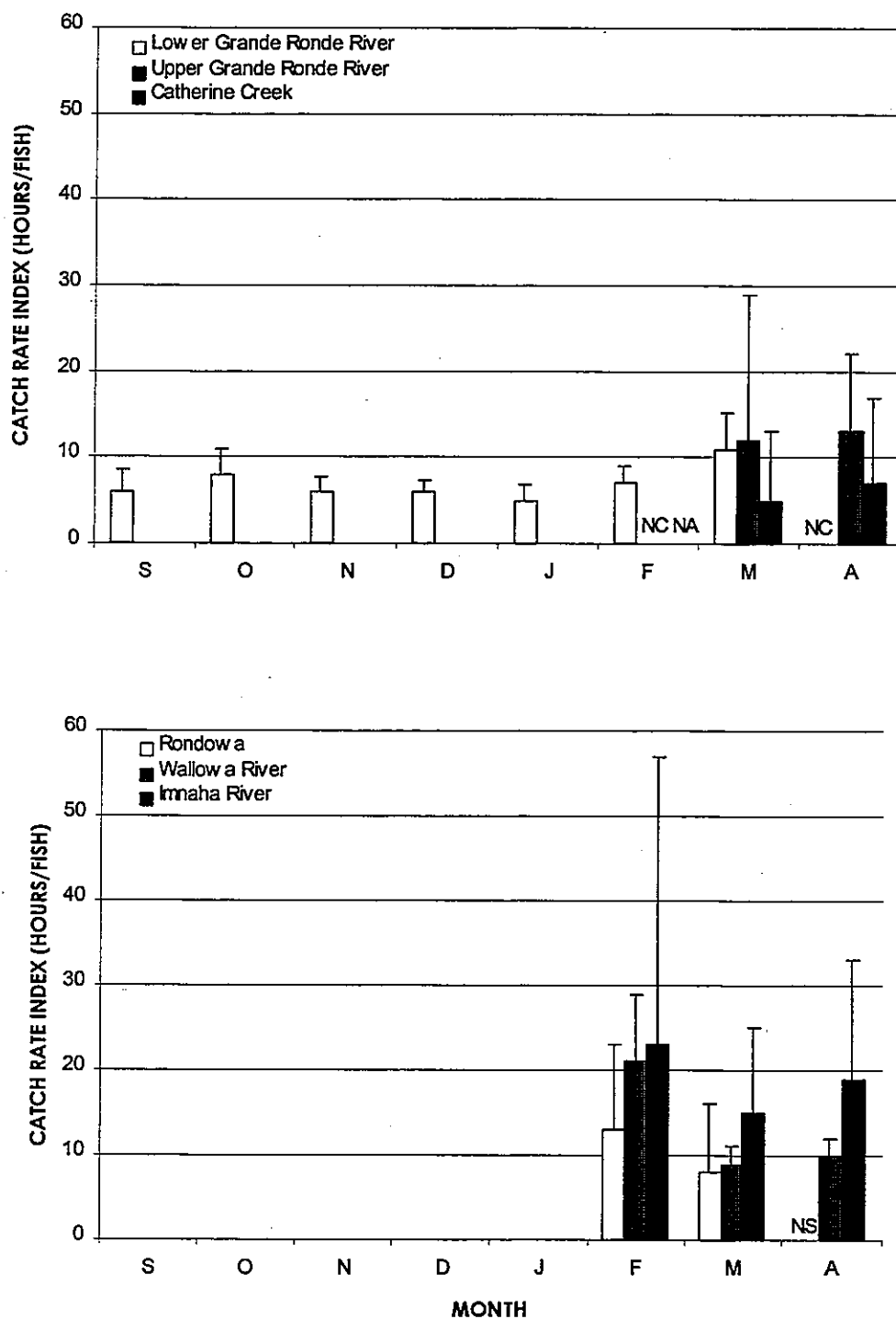


Figure 4. Estimated catch rate index (h/fish) for summer steelhead in the Grande Ronde and Imnaha basins during the 1997-98 run year. NC indicates no catch and NA indicates no anglers. Survey areas and times include the lower Grande Ronde River (1 September-to 15 April), upper Grande Ronde River, Catherine Creek, Wallowa River, Imnaha River (1 February-15 April), and Rondowa (15 February-15 March). Note: A lower catch rate index implies better angling success.

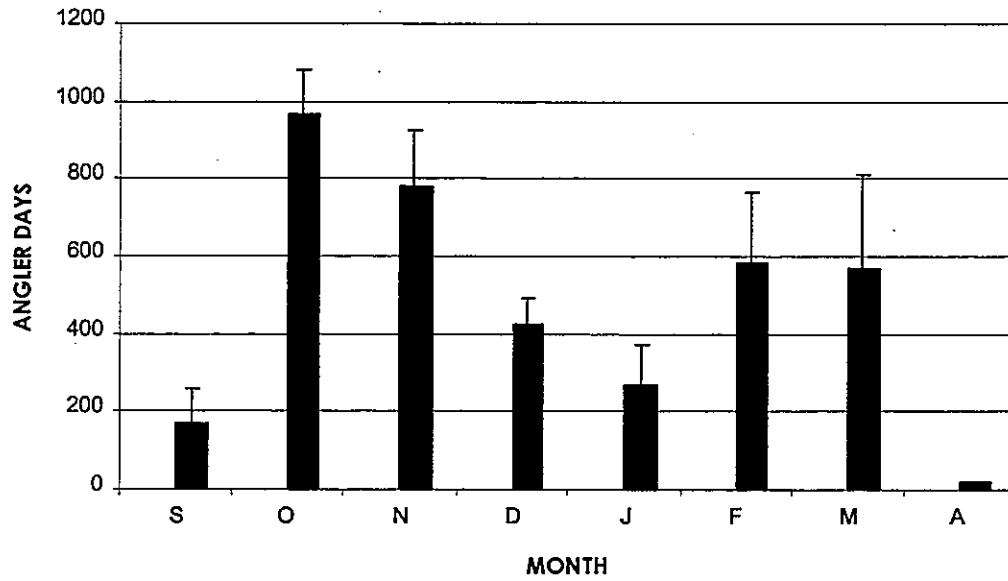


Figure 5. Estimated number of angler days for summer steelhead on the lower Grande Ronde River during the 1997-98 run year. The survey was conducted from 1 September 1997 to 15 April 1998. Error bars indicate upper 95% confidence interval.

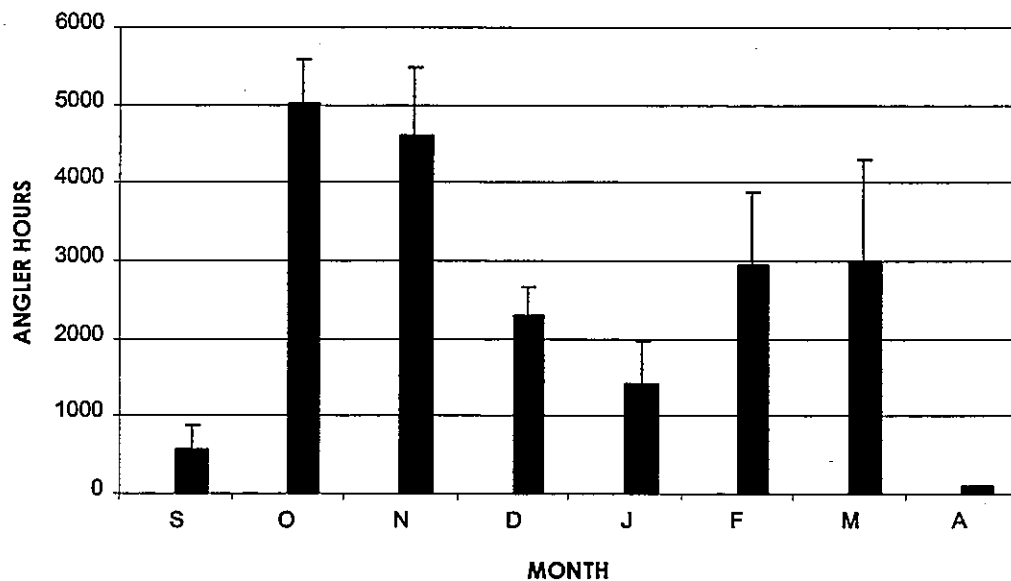


Figure 6. Estimated number of angler hours for summer steelhead on the lower Grande Ronde River during the 1997-98 run year. The survey was conducted from 1 September 1997 to 15 April 1998. Error bars indicate upper 95% confidence interval.

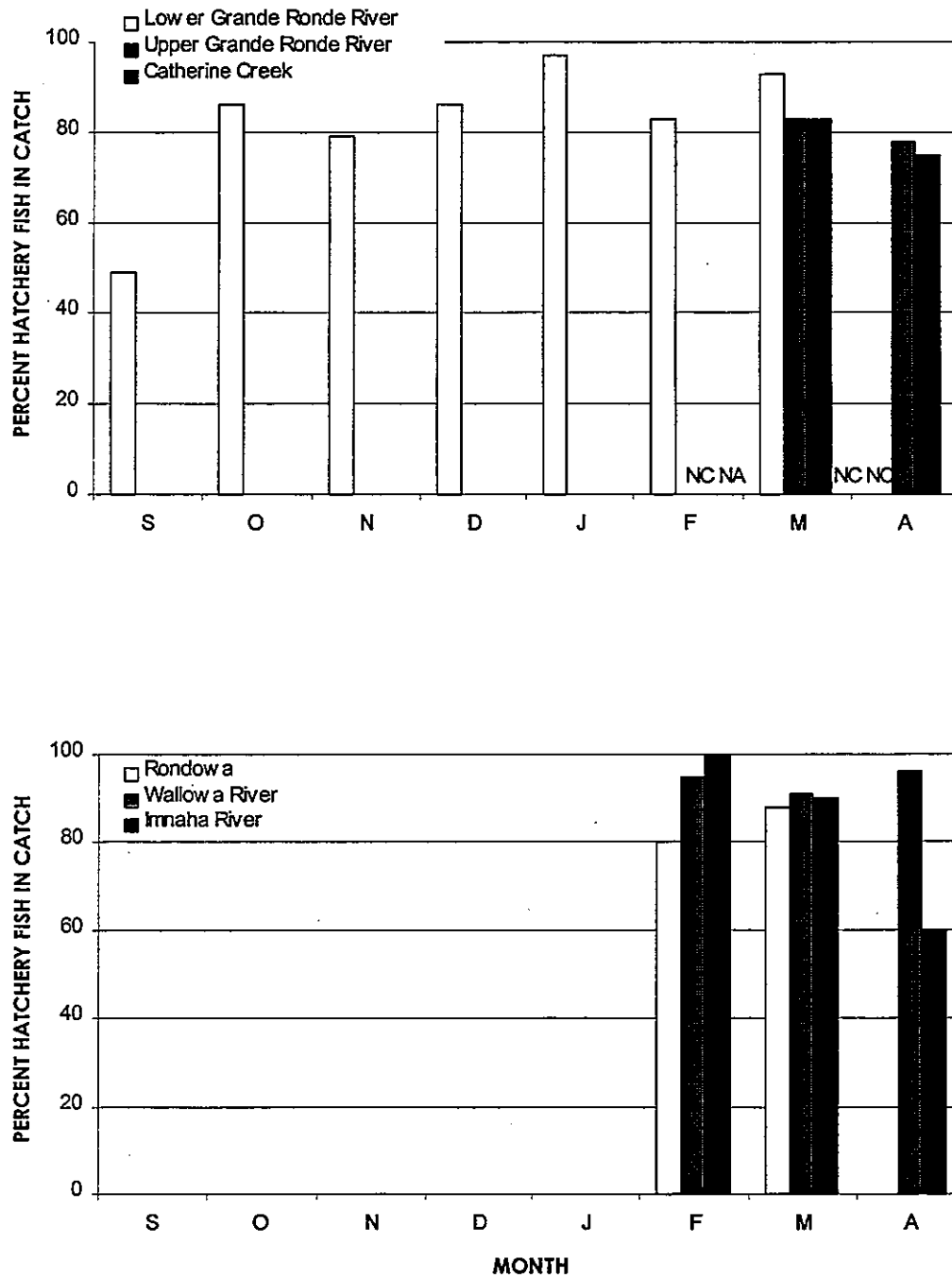


Figure 7. Estimated percent of summer steelhead caught in the Grande Ronde and Imnaha basins during the 1997-98 run year that were hatchery fish. NC indicates no catch and NA indicates no anglers. Survey areas and times include the lower Grande Ronde River (1 September-to 15 April), upper Grande Ronde River, Catherine Creek, Wallowa River, Imnaha River (1 February-15 April), and Rondowa (15 February-15 March). Error bars indicate upper 95% confidence interval.

Table 1. Percent age composition and mean fork length of hatchery summer steelhead sampled in creel surveys in the Grande Ronde and Imnaha basins during the 1997-98 run year. Age composition estimated using the percent by age and sex of hatchery returns to Wallowa Hatchery and Little Sheep Creek Facility (Imnaha River) in 1998. Age is expressed as years spent in freshwater prior to ocean migration: years spent in the ocean prior to spawning migration. Mean fork length includes  $\pm 95\%$  confidence interval.

Creel survey area, sex	N	Age composition (%)			Mean fork length (mm)
		1:1	1:2	2:1	
Lower GR River					
Males	91	78	17	5	645 $\pm$ 13
Females	143	55	45	0	643 $\pm$ 10
Total	234	64	34	2	644 $\pm$ 8
Upper GR River					
Males	2	100	0	0	603 $\pm$ 32
Females	1	100	0	0	660
Total	3	100	0	0	622 $\pm$ 63
Catherine Creek					
Males	1	100	0	0	611
Rondowa					
Males	9	78	22	0	704 $\pm$ 59
Females	4	50	50	0	643 $\pm$ 114
Total	13	69	31	0	685 $\pm$ 49
Wallowa River					
Males	160	78	17	2	653 $\pm$ 10
Females	144	55	45	0	648 $\pm$ 10
Total	304	67	30	3	651 $\pm$ 7
Imnaha River					
Males	6	83	17	0	647 $\pm$ 68
Females	8	50	50	0	641 $\pm$ 53
Total	14	64	36	0	643 $\pm$ 35

Table 2. Residence of summer steelhead anglers interviewed during creel surveys in the Grande Ronde and Imnaha basins during the 1997-98 run year.

Creel survey area	Number of anglers	Percent			
		Union or Wallowa counties	Other Oregon counties	Washington	Other states
Lower GR River	904	70	19	6	5
Upper GR River	100	95	3	1	1
Catherine Creek	17	88	6	0	6
Rondowa	38	71	29	0	0
Wallowa River	1,459	57	39	2	2
Imnaha River	111	86	10	0	4

Table 3. Number of AdLV+CWT marked summer steelhead recovered in the Grande Ronde and Imnaha basins during the 1996-97 and 1997-98 run years. No AdLV+CWT marked fish were recovered in the upper Grande Ronde River or Catherine Creek in either year. Recoveries were expanded for the entire fishery.

Run year, creel survey area	Tag code	Release site	Experimental group	Brood year	Number recovered	
					Observed	Expanded <sup>a</sup>
1996-97						
Lower Grande Ronde River	07 03 28	Deer Cr.	Direct Stream	93	2	7
	07 09 20	Deer Cr.	Direct Stream	94	2	8
	07 58 23	Spring Cr.	Production	94	2	10
	07 58 25	Deer Cr.	Acclimated	94	3	9
Wallowa River	07 03 26	Deer Cr.	Acclimated	93	3	ND
	07 09 20	Deer Cr.	Direct Stream	94	5	ND
	07 58 24	Deer Cr.	Acclimated	94	3	ND
	07 58 25	Deer Cr.	Acclimated	94	2	ND
Imnaha River	07 03 22	L. Sheep Cr.	Acclimated	93	2	ND
	07 09 19	L. Sheep Cr.	Direct Stream	94	1	ND
	07 58 20	L. Sheep Cr.	Acclimated	94	1	ND
	07 58 21	L. Sheep Cr.	Acclimated	94	3	ND
	23 23 56 <sup>b</sup>	--	NMFS	--	1	ND
1997-98						
Lower Grande Ronde River	07 09 20	Deer Cr.	Direct Stream	94	3	15
	07 58 24	Deer Cr.	Acclimated	94	1	3
	07 11 59	Deer Cr.	Acclimated	95	2	19
	07 11 60	Deer Cr.	Acclimated	95	3	17
	07 11 62	Deer Cr.	Direct Stream	95	1	6
	07 11 63	Spring Cr.	Production	95	1	13
	07 12 16	Spring Cr.	Production	95	2	11
	63 57 16 <sup>c</sup>	--	WDFW	--	1	5
Wallowa River	07 58 24	Deer Cr.	Acclimated	94	2	ND
	07 58 25	Deer Cr.	Acclimated	94	4	ND
	07 09 20	Deer Cr.	Direct Stream	94	5	ND
	07 11 59	Deer Cr.	Acclimated	95	9	ND
	07 11 60	Deer Cr.	Acclimated	95	8	ND
	07 11 61	Deer Cr.	Direct Stream	95	3	ND
	07 11 62	Deer Cr.	Direct Stream	95	9	ND
	07 11 63	Spring Cr.	Production	95	1	ND
	07 12 16	Spring Cr.	Production	95	3	ND
Rondowa	07 11 59	Deer Cr.	Acclimated	95	1	ND
Imnaha River	07 12 17	L. Sheep Cr.	Acclimated	95	1	ND

<sup>a</sup> ND indicates expansions not determined until state harvest punch card data become available.

<sup>b</sup> Steelhead with tag code 23 23 56 were marked by the National Marine Fisheries Service (NMFS) in the Snake River at Lower Granite Dam (Rkm 173), then barged and released in the Columbia River below Bonneville Dam at Rkm 227 on 18 May 1994.

<sup>c</sup> Steelhead with tag code 63 57 16 were released by Washington Department of Fish and Wildlife (WDFW) from Dayton pond (Rkm 85) on the Touchet River, WA, from 5 April to 30 May 1995.

February to 88% in March (Figure 7, Appendix B). Mean fork length ( $\pm 95\%$  confidence interval) of harvested hatchery steelhead was 704 ( $\pm 59$ ) mm for males and 643 ( $\pm 114$ ) mm for females (Table 1). Age composition of harvested hatchery steelhead was 69% 1:1's and 31% 1:2's. Sex composition was 69% male and 31% female (Table 1). Seventy-one percent of the anglers were from Union or Wallowa counties, 29% were from other Oregon counties, 0% were Washington residents and 0% resided outside the states of Oregon and Washington (Table 2). At Rondwa, anglers harvested 1 AdLV+CWT marked steelhead from our hatchery releases, however expanded estimates for the entire fishery will not be determined until state harvest punch card data become available (Table 3). Anglers did not harvest any AdLV+CWT marked steelhead at Rondwa during the 1996-97 run year (Table 3).

On the Wallowa River, the catch rate index averaged 10 hours per fish (Figure 4, Appendix A-4). The percent of steelhead caught that were hatchery fish ranged from 91% in March to 96% in April (Figure 7, Appendix B). Mean fork length ( $\pm 95\%$  confidence interval) of harvested hatchery steelhead was 653 ( $\pm 10$ ) mm for males and 648 ( $\pm 10$ ) mm for females (Table 1). Age composition of harvested hatchery steelhead was 67% 1:1's, 30% 1:2's and 3% 2:1's. Sex composition was 53% male and 47% female (Table 1). Fifty-seven percent of the anglers were from Union or Wallowa counties, 39% were from other Oregon counties, 2% were Washington residents and 2% resided outside the states of Oregon and Washington (Table 2). On the Wallowa River, anglers harvested 44 AdLV+CWT marked steelhead from our hatchery releases, however expanded estimates for the entire fishery will not be determined until state harvest punch card data become available (Table 3). During the 1996-97 run year on the Wallowa River, anglers harvested 13 AdLV+CWT marked steelhead from our hatchery releases, however expanded estimates for the entire fishery will not be determined until state harvest punch card data become available (Table 3).

On the Imnaha River, the catch rate index averaged 18 hours per fish (Figure 4, Appendix A-5). The percent of steelhead caught that were hatchery fish ranged from 60% in April to 100% in February (Figure 7, Appendix B). Mean fork length ( $\pm 95\%$  confidence interval) of harvested hatchery steelhead was 647 ( $\pm 68$ ) mm for males and 641 ( $\pm 53$ ) mm for females (Table 1). Age composition of harvested hatchery steelhead was 64% 1:1's and 36% 1:2's. Sex composition was 43% male and 57% female (Table 1). Eighty-six percent of the anglers were from Union or Wallowa counties, 10% were from other Oregon counties, 0% were Washington residents and 4% resided outside the states of Oregon and Washington (Table 2). On the Imnaha River, anglers harvested 1 AdLV+CWT marked steelhead from our hatchery releases, however expanded estimates for the entire fishery will not be determined until state harvest punch card data become available (Table 3). During the 1996-97 run year on the Imnaha River, anglers harvested 1 AdLV+CWT marked steelhead from our hatchery releases and 1 AdLV+CWT marked steelhead that was coded-wire-tagged by the National Marine Fisheries Service as a smolt in the Snake River at Lower Granite Dam, however expanded estimates for the entire fishery will not be determined until state harvest punch card data become available (Table 3).

Angler effort (Figure 8) doubled and harvest (Figure 9) was almost five times higher for the 1997-98 run year on the lower Grande Ronde River when compared to the previous year.

The percent of non-local anglers from Oregon counties other than Union and Wallowa in summer steelhead fisheries in the Grande Ronde and Imnaha basins have increased (% of anglers =  $1.25 (\text{year}) + 8.79$ ,  $r = 0.74$ ) while the percent of local Oregon (Union or Wallowa counties) anglers have decreased (% of anglers =  $-1.40 (\text{year}) + 87.19$ ,  $r = 0.76$ ) since the fishery reopened and we began surveys in 1985 (Figure 10). The percent of out-of-state anglers has not changed (% of anglers =  $0.18 (\text{year}) + 3.87$ ,  $r = 0.31$ ) since the fishery reopened. The increase of non-local anglers is independent of total angler effort (% of non-local anglers =  $0.0001 (\text{effort}) + 12.30$ ,  $r = 0.32$ ). On the Wallowa River, almost 40% of the anglers interviewed were Oregon residents from counties other than Union or Wallowa (local).

Catch rates were relatively good (175% of average) in the Grande Ronde Basin and relatively poor (75% of average) in the Imnaha Basin (Table 4).

## **MANAGEMENT IMPLICATIONS AND RECOMMENDATIONS**

Most of the fish that were caught during the 1997-98 run year were of hatchery origin. Hatchery-origin steelhead accounted for 50 to 100% of the catch, depending on the month and area sampled. On average, 78% of the fish caught for any given month in any given sample area were of hatchery origin. Furthermore, the majority of the angler effort occurred when and where hatchery fish represented the highest proportion of the catch. This is similar to what we have observed in previous years (for example Flesher et al. 1994, 1995, 1996). This data helps to emphasize the importance of the hatchery program to steelhead fisheries in the Imnaha and Grande Ronde river basins. In the near future, our ability to sustain a recreational steelhead fishery will be closely linked with our ability to maintain a hatchery program.

Each year, the recreational steelhead fishery in the Snake River tributaries of NE Oregon attracts more Oregon anglers from the counties that are not from the local area. This is evidenced by an increasing trend in the proportion of anglers from non-local Oregon counties that has been observed since the fishery reopened. This trend is accompanied by a decreasing trend in the proportion of anglers that are from local Oregon counties. The proportion of the fishery that is represented by out-of-state anglers has remained constant since the fishery reopened. These trends are independent of total angling effort. Hence, these data appear to reflect an actual recruitment of non-local Oregon anglers to the fishery, rather than a difference in the distribution of angler origin that is dependent on angling effort. The non-local anglers from Oregon are concentrating their efforts in the Wallowa River and at Rondowa (the confluence of the Wallowa and Grande Ronde

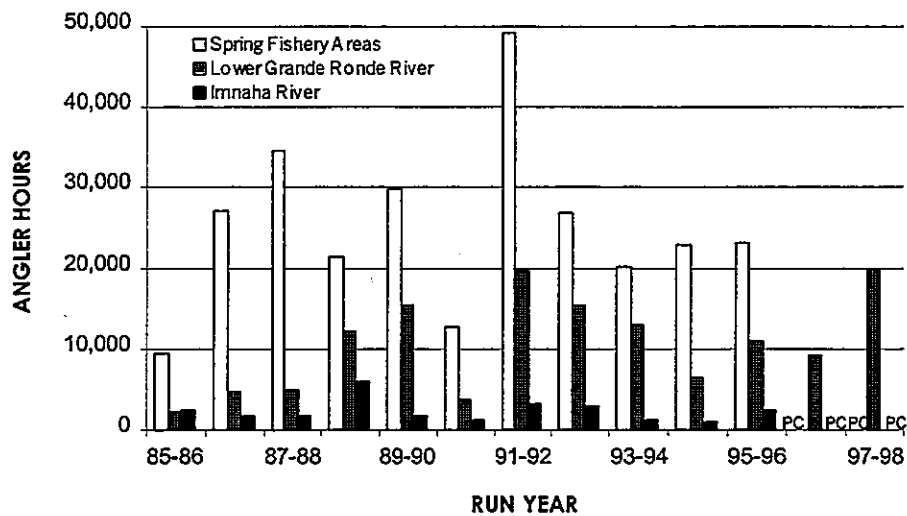


Figure 8. Angler effort for summer steelhead in spring fishery areas (upper Grande Ronde River, Wallowa River, Rondowa, and Catherine Creek) in the Grande Ronde Basin and the Imnaha River for the 1985-86 to 1995-96 run years and on the lower Grande Ronde River for the 1985-86 to 1997-98 run years. PC indicates this value must be estimated from punch card data, which was not available when this report was submitted.

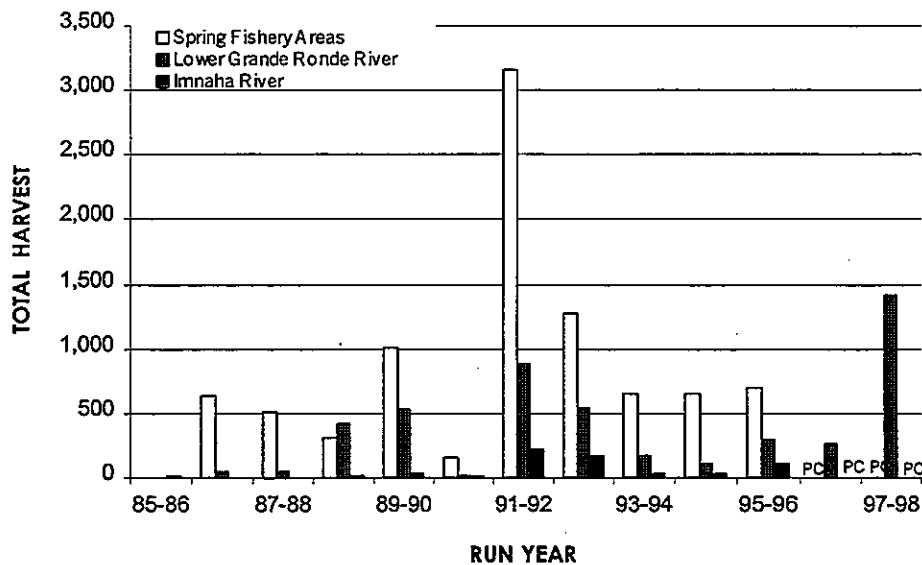


Figure 9. Number of hatchery summer steelhead harvested by recreational anglers in spring fishery areas (upper Grande Ronde River, Wallowa River, Rondowa, and Catherine Creek) in the Grande Ronde basin and the Imnaha River for the 1985-86 to 1995-96 run years and on the lower Grande Ronde River for the 1985-86 to 1997-98 run years. PC indicates this value must be estimated from punch card data, which was not available when this report was submitted.



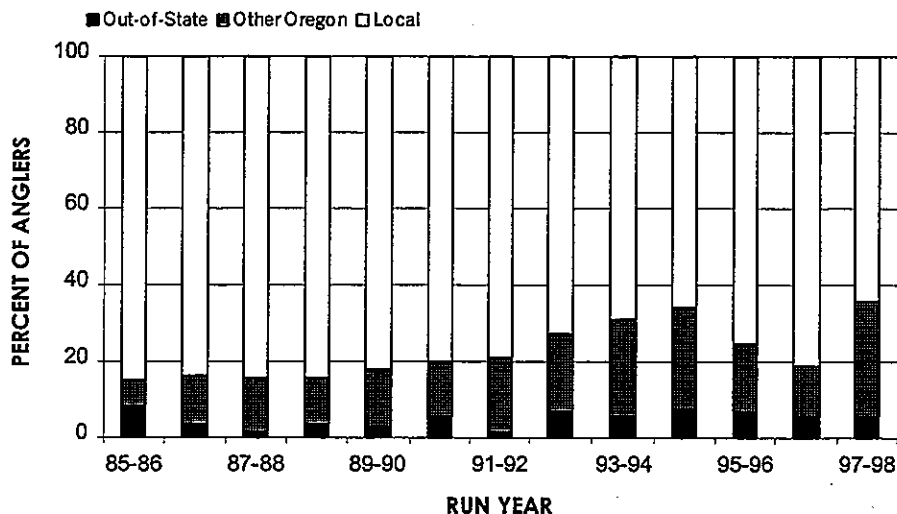


Figure 10. Percent of local (Union or Wallowa county), other Oregon county, and out-of-state anglers that fished in summer steelhead fisheries in the Grande Ronde and Imnaha basins for the 1985-86 to 1997-98 run years.

Table 4. Catch rate index (hours/fish  $\pm$  95% confidence interval) in summer steelhead fisheries in creel survey areas in the Grande Ronde and Imnaha basins for the 1985-86 to 1997-98 run years. Note: a lower catch rate index implies better angling success.

Run year	Catch rate index (hours/fish)					
	Lower GR River	Upper GR River	Catherine Creek	Rondowa	Wallowa River	Imnaha River
85-86	8 $\pm$ 7				7 $\pm$ 7	15 $\pm$ 7
86-87	9 $\pm$ 3				11 $\pm$ 3	9 $\pm$ 8
87-88	10 $\pm$ 4			11 $\pm$ 9	16 $\pm$ 3	24 $\pm$ 9
88-89	14 $\pm$ 4	40 $\pm$ 55			43 $\pm$ 21	18 $\pm$ 11
89-90	14 $\pm$ 4	14 $\pm$ 8		34 $\pm$ 27	17 $\pm$ 5	20 $\pm$ 8
90-91	19 $\pm$ 8	24 $\pm$ 11			6 $\pm$ 2	13 $\pm$ 6
91-92	11 $\pm$ 3	10 $\pm$ 3	3 $\pm$ 3	6 $\pm$ 1	10 $\pm$ 2	4 $\pm$ 1
92-93	9 $\pm$ 2	14 $\pm$ 4	49 $\pm$ 49		11 $\pm$ 2	8 $\pm$ 1
93-94	18 $\pm$ 5	31 $\pm$ 17		12 $\pm$ 4	17 $\pm$ 3	13 $\pm$ 3
94-95	21 $\pm$ 6	25 $\pm$ 13		15 $\pm$ 5	17 $\pm$ 3	17 $\pm$ 8
95-96	11 $\pm$ 2	15 $\pm$ 4			21 $\pm$ 4	7 $\pm$ 2
96-97	14 $\pm$ 4	18 $\pm$ 9	33 $\pm$ 69		13 $\pm$ 3	6 $\pm$ 2
97-98	7 $\pm$ 1	13 $\pm$ 9	7 $\pm$ 10	11 $\pm$ 6	10 $\pm$ 1	18 $\pm$ 4

rivers). These areas are typified by either relatively high catch rates, relatively easy access to anglers, or both. ODFW has expressed a desire to increase angling effort in the Imnaha and upper Grande Ronde rivers. The Imnaha River typically has some of the highest catch rates for steelhead in NE Oregon. The upper Grande Ronde River has some of the best and quickest access to steelhead fishing in NE Oregon. Thus, it may be possible to increase angling effort in the Imnaha and upper Grande Ronde rivers by improved marketing of these fisheries to non-local anglers.

Due to a shift in the priority of information needs, we recently reduced our creel survey efforts in the Snake River tributaries of NE Oregon. Briefly, we are continuing an intensive roving creel survey, with one surveyor, on the lower Grande Ronde River from 1 September through 15 April. This allows us to obtain statistically rigorous estimates of angler effort, harvest, catch, and catch rates at any point in the season. The current survey methodology that we use on the lower Grande Ronde River is the same as what we have used in the recent past. On the Wallowa, upper Grande Ronde, and Imnaha rivers as well as Catherine Creek and at Rondowa we are currently using one surveyor in the spring and concentrating on interviewing the maximum number of anglers possible. This allows us to monitor catch rates throughout the season and to sample the maximum number of harvested fish possible. To estimate effort, catch, and harvest for these fisheries it is necessary to use information from punch card data. Anglers are asked to record information voluntarily and submit their punch cards when they complete the season. These data are compiled in a centralized database. The punch card method of data collection is in contrast to the roving creel method that we have used in the recent past to monitor these steelhead fisheries. Although data from roving creel surveys and punch cards are often related, they do not generally yield the same estimates. Furthermore, it typically takes two years for punch card data for a given season to become available for estimating fishery parameters. Thus, a complete description of these fisheries will not be immediately available to managers. Management decisions concerning these fisheries will need to rely on alternative information sources.

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Appendix A-1. Fishery statistics for summer steelhead on the lower Grande Ronde River during the 1997-98 run year. Statistics include  $\pm 95\%$  confidence interval except for catch rate when expressed as h/fish. Only adipose-marked fish were harvested. "--" indicates not sampled or undefined.

Month, day type	Sample size		Total hours	Total catch	Total harvest	Catch rate		Angler days
	Days	Anglers				fish/h	(h/fish)	
September								
Weekday	6	5	96±87	27±24	0	0.281±0.246(4)		28±25
Weekend	4	30	474±288	64±30	25±21	0.135±0.064(7)		142±86
Total	10	35	570±301	91±38	25±21	0.160±0.067(6)		170±90
October:								
Weekday	7	71	2587±528	464±202	254±143	0.179±0.078(6)		485±99
Weekend	4	87	2423±260	156±92	84±60	0.064±0.038(16)		482±52
Total	11	158	5010±589	620±222	338±155	0.124±0.044(8)		967±114
November:								
Weekday	6	80	1986±771	333±117	191±82	0.168±0.059(6)		321±125
Weekend	6	114	2617±403	376±168	175±96	0.144±0.064(7)		458±71
Total	12	194	4603±870	709±204	366±126	0.154±0.044(6)		779±147
December:								
Weekday	7	58	1310±303	177±41	85±36	0.135±0.031(7)		242±56
Weekend	5	78	1003±200	202±64	72±38	0.201±0.064(5)		184±37
Total	12	136	2313±363	379±76	157±53	0.164±0.033(6)		426±67
January:								
Weekday	5	32	907±523	215±94	151±104	0.237±0.104(4)		161±93
Weekend	6	55	518±174	53±25	20±16	0.102±0.048(10)		106±36
Total	11	87	1425±551	268±98	171±105	0.188±0.069(5)		267±103
February:								
Weekday	6	59	1581±782	241±93	56±47	0.152±0.059(7)		291±144
Weekend	4	104	1380±496	172±58	110±42	0.125±0.042(8)		294±106
Total	10	163	2961±926	413±110	166±63	0.140±0.037(7)		585±183
March:								
Weekday	7	35	1097±704	71±89	46±61	0.065±0.075(15)		200±128
Weekend	6	92	1908±1069	204±68	146±58	0.107±0.035(9)		371±208
Total	13	127	3005±1280	275±111	192±84	0.092±0.036(11)		571±243
April:								
Weekday	2	1	36	0	0	--(--)		7
Weekend	2	3	61	0	0	--(--)		12
Total	4	4	97	0	0	--(--)		19
Grand total	83	904	19984±2031	2755±364	1415±256	0.138±0.018(7)		3784±385

Appendix A-2. Catch rate for summer steelhead on the upper Grande Ronde River during the 1997-98 run year. Only adipose-marked fish were harvested. "--" indicates not sampled or undefined.

Month, day type	Sample size		Catch rate	
	Days	Anglers	fish/h	(h/fish)
February:				
Weekday	3	5	0.000	(--)
Weekend	2	0	--	(--)
Total	5	5	0.000	(--)
March:				
Weekday	5	24	0.000	(--)
Weekend	2	21	0.170	(6)
Total	7	45	0.084	(12)
April:				
Weekday	2	15	0.000	(--)
Weekend	2	35	0.103	(10)
Total	4	50	0.080	(13)
Grand total	16	100	0.078	(13)

Appendix A-3. Catch rate for summer steelhead on Catherine Creek during the 1997-98 run year. Only adipose-marked fish were harvested. "--" indicates not sampled or undefined.

Month, day type	Sample size		Catch rate	
	Days	Anglers	fish/h	(h/fish)
February:				
Weekday	3	0	--	(--)
Weekend	1	0	--	(--)
Total	4	0	--	(--)
March:				
Weekday	5	3	0.000	(--)
Weekend	2	4	0.000	(--)
Total	7	7	0.000	(--)
April:				
Weekday	2	2	0.233	(4)
Weekend	2	8	0.179	(6)
Total	4	10	0.202	(5)
Grand total	15	17	0.141	(7)

Appendix A-4. Catch rate for summer steelhead at Rondowa during the 1997-98 run year. Only adipose-marked fish were harvested. "--" indicates not sampled or undefined.

Month, day type	Sample size		Catch rate	
	Days	Anglers	fish/h	(h/fish)
February:				
Weekday	2	12	0.083	(12)
Weekend	1	16	0.072	(14)
Total	3	28	0.075	(13)
March:				
Weekday	1	10	0.123	(8)
Total	1	10	0.123	(8)
Grand total	4	38	0.091	(11)

Appendix A-5. Catch rate for summer steelhead on the Wallowa River during the 1997-98 run year. Only adipose-marked fish were harvested. "--" indicates not sampled or undefined.

Month, day type	Sample size		Catch rate	
	Days	Anglers	fish/h	(h/fish)
February:				
Weekday	13	150	0.056	(18)
Weekend	5	147	0.036	(30)
Total	18	297	0.047	(21)
March:				
Weekday	10	355	0.121	(8)
Weekend	6	370	0.104	(10)
Total	16	725	0.112	(9)
April:				
Weekday	7	259	0.112	(9)
Weekend	3	177	0.079	(13)
Total	10	436	0.097	(10)
Grand total	44	1458	0.096	(10)

Appendix A-6. Catch rate for summer steelhead on the Imnaha River during the 1997-98 run year. Only adipose-marked fish were harvested. "--" indicates not sampled or undefined.

Month, day type	Sample size		Catch rate	
	Days	Anglers	fish/h	(h/fish)
February:				
Weekday	4	4	0.000	(--)
Weekend	2	8	0.057	(18)
Total	6	12	0.043	(23)
March:				
Weekday	3	15	0.032	(31)
Weekend	2	23	0.094	(11)
Total	5	38	0.068	(15)
April:				
Weekday	2	24	0.080	(13)
Weekend	2	37	0.035	(29)
Total	4	61	0.052	(19)
Grand total	15	111	0.056	(18)

Appendix B. The percent of summer steelhead caught by month in the Grande Ronde and Imnaha basins during the 1997-98 run year that were hatchery fish. Total catch for Lower Grande Ronde River and sampled catch for the Upper Grande Ronde, Wallowa and Imnaha rivers are shown in parentheses. "--" indicates not sampled or undefined.

Creel survey area	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Lower Grande Ronde River	49(91)	86(620)	79(709)	86(379)	97(268)	83(413)	93(275)	--(0)
Upper Grande Ronde River	--(--)	--(--)	--(--)	--(--)	--(--)	--(0)	83(6)	78(9)
Catherine Creek	--(--)	--(--)	--(--)	--(--)	--(--)	--(--)	--(0)	75(4)
Rondowa	--(--)	--(--)	--(--)	--(--)	--(--)	80(10)	88(8)	--(--)
Wallowa River	--(--)	--(--)	--(--)	--(--)	--(--)	95(37)	91(273)	96(165)
Imnaha River	--(--)	--(--)	--(--)	--(--)	--(--)	100(2)	90(10)	60(15)





Post Office Box 59  
Portland, Oregon 97207

